What Is Claimed Is:

1. A method of processing a plurality of layer-3 datagrams in a first edge router, said first edge router being connected to a second edge router by a layer-2 network, said method comprising:

provisioning in said first edge router a plurality of virtual circuits on said layer-2 network, said plurality of virtual circuits being associated with a layer-3 route;

receiving in said first edge router said plurality of layer-3 datagrams;

determining in said first edge router a subset of layer-3 datagrams, with each datagram having a corresponding layer-3 route equal to said layer-3 route, wherein said subset of layer-3 datagrams are comprised in said plurality of layer-3 datagrams;

encapsulating each of said subset of layer-3 datagrams in a corresponding plurality of layer-2 packets, some of said subset of layer-3 datagrams being encapsulated for sending on a first one of said plurality of virtual circuits and some other of said subset of layer-3 datagrams being encapsulated for transmission on another one of said plurality of virtual circuits; and

sending said plurality of layer-2 packets related to said subset of layer-3 datagrams on said layer-2 network according to said encapsulating.

2. The method of claim 1, wherein said determining comprises using a destination address comprised in each of said layer-3 datagrams to determine said corresponding layer-3 route.

3. The method of claim 2, wherein said layer-2 network comprises a plurality of switches providing a plurality of physical paths between said first edge router and said second edge router, said first one of said plurality of virtual circuits being provided on a first one of said plurality of physical paths and said second one of said plurality of virtual circuits being provided on a second one of said plurality

5   of physical paths.

1   4. The method of claim 2, further comprising selecting one of said plurality of virtual circuits

2   for transmitting each of said subset of layer-3 datagrams, wherein said encapsulating is performed after

3   said selecting.

1   5. The method of claim 4, wherein said determining comprises retrieving a route entry from a

2   forwarding table using said destination address of a first IP datagram, wherein said route entry indicates

3   whether said IP route is to be used to transport said first IP datagram, and wherein said selecting is

4   performed based on said route entry.

1   6. The method of claim 5, wherein said determining is implemented in the form of a process

2   under the control of a scheduler, wherein said process and said scheduler are implemented substantially

3   in the form of software in said first edge router.

1   7. The method of claim 4, wherein said determining and selecting are implemented using a data

2   structure, which when traversed using said destination address returns a layer-2 header corresponding

3   to a virtual circuit on which a corresponding IP datagram is to be sent.

1   8. The method of claim 7, wherein said determining and said selecting are implemented in an

2   interrupt handler and wherein said data structure comprises a tree..

1   9. The method of claim 2, wherein layer-3 comprises Internet Protocol (IP) such that layer-3

2 datagrams, layer-3 protocol, and layer-3 route respectively comprise IP datagrams, IP protocol, and

3 IP route, and wherein said layer-2 comprises asynchronous transfer mode (ATM) such that said layer-2

4 packets comprise ATM cells.

1   10. A computer readable medium carrying one or more sequences of instructions for causing

2 a first edge router to process a plurality of layer-3 datagrams in a first edge router, said first edge router

3 being connected to a second edge router by a layer-2 network, wherein execution of said one or more

4 sequences of instructions by one or more processors contained in said first edge router causes said one

5 or more processors to perform the action of:

6   provisioning in said first edge router a plurality of virtual circuits on said layer-2 network, said

7 plurality of virtual circuits being associated with a layer-3 route;

8   receiving in said first edge router said plurality of layer-3 datagrams;

9   determining in said first edge router a subset of layer-3 datagrams, with each datagram having

10 a corresponding layer-3 route equal to said layer-3 route, wherein said subset of layer-3 datagrams are

11 comprised in said plurality of layer-3 datagrams;

12   encapsulating each of said subset of layer-3 datagrams in a corresponding plurality of layer-2

13 packets, some of said subset of layer-3 datagrams being encapsulated for sending on a first one of said

14 plurality of virtual circuits and some other of said subset of layer-3 datagrams being encapsulated for

15 transmission on another one of said plurality of virtual circuits; and

16   sending said plurality of layer-2 packets related to said subset of layer-3 datagrams on said

17 layer-2 network according to said encapsulating.

1   11. The computer readable medium of claim 10, wherein said determining comprises using a

2   destination address comprised in each of said layer-3 datagrams to determine said corresponding layer-

3   3 route.

1   12. The computer readable medium of claim 11, wherein said layer-2 network comprises a

2   plurality of switches providing a plurality of physical paths between said first edge router and said

3   second edge router, said first one of said plurality of virtual circuits being provided on a first one of said

4   plurality of physical paths and said second one of said plurality of virtual circuits being provided on a

5   second one of said plurality of physical paths.

1   13. The computer readable medium of claim 11, further comprising selecting one of said

2   plurality of virtual circuits for transmitting each of said subset of layer-3 datagrams, wherein said

3   encapsulating is performed after said selecting.

1   14. The computer readable medium of claim 13, wherein said determining comprises retrieving

2   a route entry from a forwarding table using said destination address of a first IP datagram, wherein said

3   route entry indicates whether said IP route is to be used to transport said first IP datagram, and wherein

4   said selecting is performed based on said route entry.

1   15. The computer readable medium of claim 14, wherein said determining is implemented in

2   the form of a process under the control of a scheduler, wherein said process and said scheduler are

3   implemented substantially in the form of software in said first edge router.

1   16. The computer readable medium of claim 13, wherein said determining and selecting are

2   implemented using a data structure, which when traversed using said destination address returns a layer-

3   2 header corresponding to a virtual circuit on which a corresponding IP datagram is to be sent.

1   17. The computer readable medium of claim 16, wherein said determining and said selecting

2   are implemented in an interrupt handler and wherein said data structure comprises a tree.

1   18. A first edge router for processing a plurality of layer-3 datagrams, said first edge router

2   being connected to a second edge router by a layer-2 network, said first edge router comprising:

3   means for provisioning a plurality of virtual circuits on said layer-2 network, said plurality of

4   virtual circuits being associated with a layer-3 route;

5   means for receiving in said first edge router said plurality of layer-3 datagrams;

6   means for determining in said first edge router a subset of layer-3 datagrams, with each

7   datagram having a corresponding layer-3 route equal to said layer-3 route, wherein said subset of layer-

8   3 datagrams are comprised in said plurality of layer-3 datagrams;

9   means for encapsulating each of said subset of layer-3 datagrams in a corresponding plurality

10   of layer-2 packets, some of said subset of layer-3 datagrams being encapsulated for sending on a first

11   one of said plurality of virtual circuits and some other of said subset of layer-3 datagrams being

12   encapsulated for transmission on another one of said plurality of virtual circuits; and

13   means for sending said plurality of layer-2 packets related to said subset of layer-3 datagrams

14   on said layer-2 network according to said encapsulating.

1   19. The first edge router of claim 18, wherein said means for determining uses a destination

2   address comprised in each of said layer-3 datagrams to determine said corresponding layer-3 route.

1   20. The first edge router of claim 19, further comprising means for selecting one of said

2   plurality of virtual circuits for transmitting each of said subset of layer-3 datagrams.

1   21. The first edge router of claim 20, wherein said means for determining retrieves a route entry

2   from a forwarding table using said destination address of a first IP datagram, wherein said route entry

3   indicates whether said IP route is to be used to transport said first IP datagram, and wherein said

4   selecting is performed based on said route entry.

1   22. The first edge router of claim 20, wherein said means for determining and said means for

2   selecting are implemented using a data structure, which when traversed using said destination address

3   returns a layer-2 header corresponding to a virtual circuit on which a corresponding IP datagram is to

4   be sent.

1   23. A first edge router for processing a plurality of layer-3 datagrams, said first edge router

2   being connected to a second edge router by a layer-2 network, said first edge router comprising:

3   a memory storing data indicating that a plurality of virtual circuits are provisioned to said second

4   edge router on said layer-2 network, said data further indicating that said plurality of virtual circuits are

5   associated with a layer-3 route;

6   an inbound interface receiving said plurality of layer-3 datagrams, wherein a subset of layer-3

7   datagrams comprised in said plurality of layer-3 datagrams are to be transmitted on said layer-3 route;

8   a virtual circuit (VC) determination block determining to send some of said subset of layer-3

9   datagrams on a first one of said plurality of virtual circuits and some other of said subset of layer-3

10 datagrams on another one of said plurality of virtual circuits; and

11   an outbound interface sending each of said subset of layer-3 datagrams on a determined one

12 of said plurality of virtual circuits in the form of a plurality of layer-2 packets on said layer-2 network.

1   24. The first edge router of claim 23, further comprising:

2   a segmentation block segmenting each of said subset of layer-3 datagrams into a plurality of

3   payloads; and

4   an encapsulator encapsulating said plurality of payloads in a corresponding plurality of layer-2

5   packets, wherein said plurality of layer-2 packets corresponding to each layer-3 datagram are

6   encapsulated according to the determination of said VC determination block;

7   wherein said determining comprises using a destination address comprised in each of said layer-3

8   datagrams to determine said corresponding layer-3 route.

1   25. The first edge router of claim 24, wherein said layer-2 network comprises a plurality of

2   switches providing a plurality of physical paths between said first edge router and said second edge

3   router, said first one of said plurality of virtual circuits being provided on a first one of said plurality of

4   physical paths and said second one of said plurality of virtual circuits being provided on a second one

5   of said plurality of physical paths.

1   26. The first edge router of claim 24, further comprising:

2   a forwarding table containing a plurality of route entries; and

3   a forwarding block retrieving a route entry from said forwarding table using said destination

4   address of a first IP datagram, wherein said route entry indicates whether said IP route is to be used

5   to transport said first IP datagram, and wherein said VC determination block selects either said first one

6   of said plurality of virtual circuits or said another one of said plurality of virtual circuits based on said

7   route entry.

1   27. The first edge router of claim 24, further comprising a data structure, which when traversed

2   using said destination address returns a layer-2 header corresponding to a virtual circuit on which a

3   corresponding IP datagram is to be sent.

1   28. The first edge router of claim 2, wherein layer-3 comprises Internet Protocol (IP) such that

2   layer-3 datagrams, layer-3 protocol, and layer-3 route respectively comprise IP datagrams, IP

3   protocol, and IP route.

1   29. The first edge router of claim 28, wherein each of said plurality of virtual circuits comprises

2   a permanent virtual circuit (PVC).

1   30. The first edge router of claim 29, wherein datagrams related to the same flow are

2   transmitted on the same virtual circuit such that an end system need not re-sequence the data in the

3   received datagrams.